

Journal of Endodontics, 1995, Vol. 21

**Articles Of Endodontic Interest From
Other Journals**

**Col. Schindler, Chairman Of Endodontics
59th MDW Dental Directorate
Lackland AFB, TX**

Articles:

Click On The Topic You Wish To View

- **Toxic systemic reactions of bupivacaine and etidocaine**
- **Importance of clinical examination and diagnosis: a case of dens invaginatus**
- **Long-term results of amalgam versus glass ionomer cement as apical sealant after apicoectomy**
- **Coronal adaptation and coronal leakage: lateral condensation compared to Thermafil**
- **Guided bone regeneration in the treatment of a large periapical lesion: a case report**
- **Transient apical breakdown following subluxation injury: a case report**
- **Treatment of large periapical lesions by inserting a drainage tube into the root canal**
- **Extracanal invasive resorption: an update**
- **Nonsurgical re-treatment of endodontic failures**
- **Use of mineral trioxide aggregate for repair of furcal perforations**
- **Electronic canal length measurement**
- **New philosophy for the treatment of avulsed teeth**

Journal of Endodontics, 1995, Vol. 21

**Articles Of Endodontic Interest From
Other Journals (Cont.)**

**Col. Schindler, Chairman Of Endodontics
59th MDW Dental Directorate
Lackland AFB, TX**

Articles:

Click On The Topic You Wish To View

- **Implications, prevention, and management of subcutaneous emphysema during endodontic treatment**
- **Maxillary permanent central incisor with abnormal crown size and dens invaginatus: case report**
- **Importance of anatomic variables in endodontic treatment outcomes: case report**
- **Cutting ability of an ultrasonic retrograde cavity preparation instrument**
- **Ultrasonic preparation and obturation of root-end cavities**

Toxic systemic reactions of bupivacaine and etidocaine

Bacsik CJ, Hargreaves KM. Toxic systemic reactions of bupivacaine and etidocaine. Oral Surg. 1995;79:18-23.

PURPOSE: To review the systemic toxicity of bupivacaine and etidocaine.

SUMMARY: Multiple case reports describing morbidity and mortality shortly after injection of even small doses of bupivacaine or etidocaine have been found in the literature. Generally the CNS is more sensitive to local anesthetics than the cardiovascular system. Therefore initial signs of toxicity include dizziness, circumoral anesthesia, visual and auditory disturbances, apprehension, disorientation, and localized involuntary muscular activity. Convulsions may develop. Cardiovascular response may include a variety of arrhythmias of which ventricular tachycardia and ventricular fibrillation are the most common. Since these long lasting agents occupy the myocardial sodium channel for extended periods of time, these arrhythmias are more resistant to even aggressive treatment attempts, and often result in death. Bupivacaine is at least 4 times as potent as lidocaine in its CNS and Cardiovascular toxicity potential. The recommended maximum doses for bupivacaine (90 mg or 1.25 mg/kg) and etidocaine (400 mg or 8.0 mg/kg) are based on animal studies and may be higher than what should be given in humans. Care should be used when administering these drugs to medically compromised patients. Intra-vascular injections should be avoided and maximum dosages carefully followed.

February 1995
ACLS - YES

Martin Gambill

Importance of clinical examination and diagnosis: a case of dens invaginatus

Ikeda H, Yoshioka T, Suda H. Importance of clinical examination and diagnosis: a case of dens invaginatus. Oral Surg 1995;79:88-91.

PURPOSE: To demonstrate a case in which a patient, whose maxillary left incisor was dens invaginatus, was about to be treated inappropriately after an unsatisfactory examination.

CASE REPORT: A 11-yr-old girl presented with a periapical radiolucency and a fistula located on the distal portion of the root of the left maxillary lateral incisor. Both the lateral incisor and canine responded normally to thermal, percussion, and palpation testing. Surgical intervention was planned to remove a cyst. At the last moment, a dens invaginatus was found and treated nonsurgically. The dens tract did not communicate with the main canal. The pulp retained vitality throughout the 27 month recall period.

C&C: The incidence of dens invaginatus is from 0.04% to 10%. In this case, the dens tract was probably exposed as a result of orthodontic tooth movement. This case highlights the need for careful examination and correct diagnosis.

February 1995

Bruce Poulsen

Long-term results of amalgam versus glass ionomer cement as apical sealant after apicoectomy

Jesslen P, Zetterqvist L, Heimdahl A. Long-term results of amalgam versus glass ionomer cement as apical sealant after apicoectomy. Oral Surg 1995;79:101-3.

PURPOSE: To investigate whether amalgam can be replaced by glass ionomer cement as an apical sealant without a decrease in long-term success.

M&M: Sixty-seven patients who had 82 teeth with periapical lesions received either amalgam or glass ionomer cement (Chem-fil) in the root end preparation. The teeth were followed for up to five years. The teeth were classified as complete healing, improvement, no improvement, or failure.

RESULTS: No statistically significant difference in success or failure rates was observed between teeth sealed with amalgam or glass ionomer cement after 1 or 5 years. Both materials had 90% success rates at 5 year follow-up. Ninety-five percent of treated teeth yielding a successful result at 1 year remained so after 5 years. Also, unsuccessful cases at 1 year remained unsuccessful.

C&C: Glass ionomer cement was as successful as amalgam as an apical sealant after apicoectomy in a five year follow-up.

February 1995

Bruce Poulsen

Coronal adaptation and coronal leakage: lateral condensation compared to Thermafil

Baumgardner KR, Taylor J, Walton RE. Coronal adaptation and coronal leakage: lateral condensation compared to Thermafil. J Am Dent Assoc 1995;126:351-6.

PURPOSE: To test the ability of three obturating techniques to adapt and seal the coronal portion of the canal.

M&M: 64 extracted single-canaled human premolars were instrumented and obturated with lateral condensation, lateral condensation then vertical compaction, or metal Thermafil obturation. The teeth were submerged in artificial saliva for 5 days. Then they were placed in carbon dye for 48 hours to determine the extent of dye leakage. The extent and pattern of dye leakage were evaluated.

RESULTS: The lateral plus vertical compaction group had the least dye leakage, the lateral only condensation group scored second and Thermafil demonstrated the most leakage. It was difficult to predictably deliver all of the gutta-percha on a Thermafil carrier through the standard premolar access opening.

C&C: Obturation techniques that permit controlled, incremental additions of gutta-percha would be indicated in canals with irregular structure and in tapering canals.

March 1995

Bruce Poulsen

Guided bone regeneration in the treatment of a large periapical lesion: a case report

Pinto VS, Zuolo ML, Mellonig JT. Guided bone regeneration in the treatment of a large periapical lesion: a case report. The Regeneration Report 1995 1995;7:76-81.

PURPOSE: To present a case report of a large periapical defect treated with guided bone regeneration and a bone graft.

CASE REPORT: 39 year old male had a lesion related to the endodontically treated maxillary left lateral incisor. There was no pain or other symptomatology. The lesion was in close proximity to the nasal floor and the anterior border of the maxillary sinus. The clinical diagnosis identified a pulpless tooth with a failed endodontic treatment associated with a large periapical lesion. Surgical access was obtained. The osseous defect measured 19 mm by 24 mm and extended through both cortical plates. DFDBA was placed into the defect and GTAM e-PTFE physical barriers were placed to cover the defect on the buccal and palatal. The pt was placed on Amoxicillin for 10 days and Peridex for 7 days. The membranes were removed after 7 months. Complete osseous healing of the labial and palatal cortical plates were healed. A biopsy was obtained. Histologic analysis revealed mature lamellar bone associated with hematopoietic marrow and DFDBA.

C&C: This technique may be a valuable treatment modality to promote more predictable bone formation in the treatment of large periapical lesions after endodontic surgery. However, the procedure described in this paper is very expensive and many patients would not be able to afford such treatment.

March 1995

Bruce Poulsen

Transient apical breakdown following subluxation injury: a case report

Boyd KS. Transient apical breakdown following subluxation injury: a case report. Endod Dent Traumatol 1995;11:37-40.

PURPOSE: To show the development and resolution without pulpal therapy of a periapical radiolucency after a subluxation injury.

CASE REPORT: A 27 year old male was hit in the mouth while participating in a sporting event. The four max incisors were subluxated with class II mobility. The four teeth responded normally to EPT and carbon dioxide snow. One month after the accident, the right central incisor was hypersensitive to cold. All four teeth responded normally to palpation and percussion. The right central incisor had class I mobility, but no excessive occlusal contact and it responded to EPT, but at a higher threshold. A periapical radiograph showed a periapical radiolucency at the apex of #25. The occlusion was relieved, but root canal treatment was not initiated. Three months later, the patient had the same complaint and the vitality tests gave the same results. The periapical radiolucency was still present. Ten months after the trauma, #25 had a delayed response to cold and EPT. The radiograph showed blunting of the apex and no periapical lucency. Twenty-seven months after the trauma, #25 had normal mobility and a positive EPT response. The periapical lucency did not return.

C: This case corresponds with the findings of Andreasen concerning traumatized teeth and transient apical breakdown. In a case in which a lucency is accompanied by positive vitality tests in traumatized teeth, it seems justified to wait and monitor the teeth.

March 1995

Bruce Poulsen

Treatment of large periapical lesions by inserting a drainage tube into the root canal

Tsurumachi T, Saito T. Treatment of large periapical lesions by inserting a drainage tube into the root canal. Endod Dent Traumatol 1995;11:41-46.

PURPOSE: To introduce an alternative method of large periapical lesion treatment by inserting a drainage and depressurization tube into the root canal space.

Method: The teeth with large periapical lesions and uncontrolled exudate should be selected for this procedure. A thin-walled stainless steel tube (1.2 mm external diameter) is inserted in the prepared canal without excessive binding. The tube is checked weekly for the first month and then twice a month after. The tube should be removed and cleaned at each evaluations appointment. After 3-4 months of drainage and depressurization, the tube is removed. The tooth is temporized until the canal can be dried with paper points. When the canal can be dried, the root canal treatment is completed. The authors present two cases in which this technique is used. In both cases it took multiple visits after the tube was removed to get the canal filled with gutta-percha.

C: An interesting technique trying to avoid surgical cystic decompression procedures. Unfortunately, this technique allows for contamination of the root canal space and dentinal tubules which may account for the multiple visits required after the tube is removed from the tooth.

March 1995

Bruce Poulsen

Extracanal invasive resorption: an update

Frank AL. Extracanal invasive resorption: an update. *Compend Contin Educ Dent* 1995;16:250-62.

PURPOSE: Title

DISCUSSION: Extracanal invasive resorption was described as early as 1920 when Mummery reported on the "pink spot". EIR has an external origin, invades the dentin, and surround the root canal system. It is neither associated with nor involves the dental pulp. The etiology of EIR is presumed to be injury and irritation or the PDL. This may be caused by orthodontic pressure, damaged predentin, or pressure from ectopic eruption. Also, some cases have been reported in teeth after internal bleaching procedures. The first indication of EIR is usually seen during the examination of routine radiographs. A moth-eaten, irregular area of resorption is evident in the dentin surrounding the root canal space. There is a definite separation from the canal by a resistant protective shell. Close examination will show that the outline and the integrity of the canal space remains interrupted and intact. The pulp remains responsive to electric and thermal testing and the patient is not aware of any clinical symptoms. EIR originates in the cementum and there is usually just one portal of entry. After an EIR enters the dentin, the invasive destruction takes place. Neither periodontal or bone breakdown is apparent. Treatment of this resorption requires obliteration of the portal site along with the dentin resorptive defect. Histologic findings show a vascular bone replacement with minimal or no inflammation. EIR and internal resorption can be clinically and radiographically similar. However, off angled radiographs should be taken to differentiate between the conditions. EIR is further classified as intraosseous, crestal, or supraosseous. The treatment modality and prognosis would be based on its location, extent, and accessibility. Intraosseous EIR is treated by completing the root canal routinely with a gutta-percha filling. Through the access opening, the resorptive defect is located and debrided with a long-shank round bur. This is followed with filling the defect with restorative material. An alternative (experimental) treatment for intraosseous EIR is intentional replantation. Crestal EIR is debrided from the coronal access and filled with restorative material. Supraosseous EIR is treated from an external approach. With ideal labial access, the resorption can be carefully excavated without exposing the pulp, thus eliminating the routine inclusion of root canal treatment. If access is not ideal, treatment would need to proceed through the coronal access. A treatment misconception suggesting that a calcium hydroxide paste be placed in the root canal for correction of the resorptive process exists. Intracanal therapy alone does not affect the progression of this resorptive entity.

April 1995

Bruce Poulsen

Nonsurgical re-treatment of endodontic failures

Weine FS. Nonsurgical re-treatment of endodontic failures. *Compend Contin Educ Dent* 1995;16:324-35.

PURPOSE: Title

DISCUSSION: New developments like the surgical microscope and ultrasonic systems have improved our ability to complete surgical treatment, and more and more endodontic failures are being treated surgically. The author offers evidence that non-surgical retreatment should be accomplished whenever possible before surgical treatment is considered. At recall appointments the tooth or teeth should be closely evaluated with multiple angled radiographs and thorough clinical exam to determine success or failure. A condition known as incipient periapical lesion (IPL) may occur and make the treated tooth appear to be worsening radiographically, but these lesions eventually heal without intervention. Therefore, without clinical symptoms these cases should be given adequate time to heal (at least 1 year) prior to intervention. It is important to attempt to determine the cause of failure. The following can often be retreated without surgery: 1. Short or incomplete fills, 2. Overextended fills, and 3. Untreated (missed) canal. The following failures usually require surgery: 1. Inability to remove old canal filling, 2. Inability to remove post, 3. Severe apical perforation, 4. Inability to reach the apex through the canal. Overextended fills can be retreated by removing the material to the apex. There is no need to remove the overextension since the excess will usually resorb over time. The key for many retreatment cases is the ultrasonic unit which facilitates removal of filling material and canal blockages. Multiple horizontal radiographs should be taken to evaluate for missed canals. Calcium hydroxide should be used in cases where continuous drainage is a problem. If surgery is still necessary following nonsurgical retreatment, the canals are now clean and well obturated which increases the prognosis for the surgical treatment.

April 1995

Martin Gambill

Use of mineral trioxide aggregate for repair of furcal perforations

***Pitt Ford TR, Torabinejad M, McKendry DJ, Hong C-U, Kariyawasam SP.
Use of mineral trioxide aggregate for repair of furcal perforations. Oral
Surg 1995;79:756-63.***

PURPOSE: To examine histologically the tissue response to experimentally induced furcal perforations, repaired with amalgam or MTA either immediately or after salivary contamination.

M&M: Thirty furcal perforations were made through the floor of the pulp chambers into the furcation in mandibular premolars in 7 beagle dogs. In half the teeth, amalgam or MTA was used to fill the perforation immediately. In the other half, the perforations were left open to salivary contamination for 6 weeks. The presence of lesions was confirmed by radiographic evidence of bone loss. These lesions were cleaned with NaOCl and filled with amalgam or MTA. Animals were killed 4 months later. Tissue blocks were prepared and sectioned longitudinally in a buccolingual direction through the area of furcal perforation. Sections were stained and examined for the presence, severity, and extent of inflammation.

RESULTS: In teeth repaired immediately with MTA, no inflammation was seen in 5 of 6 teeth; cementum formation was also seen in 5 of 6 teeth. In teeth repaired immediately with amalgam, all were associated with inflammation, often moderate or severe. In specimens where repair was delayed, 3 of 7 repaired with MTA were free of inflammation, while all teeth repaired with amalgam were associated with inflammation which was more severe and extensive than that associated with the MTA.

C&C: Histologic evidence points to the formation of cementum growth around MTA, as has been shown when MTA has been used as a root end filling material (Pitt Ford, et al, 1994). In addition, an apparent PDL was seen separating the cementum from bone. MTA thus shows promise as a furcal perforation repair material, especially when used immediately after perforation.

June 1995

Michael Hall

Electronic canal length measurement

Kobayashi C. Electronic canal length measurement. Oral Surg 1995;79:226-31.

PURPOSE: To describe the history, current rationale, methods, and future possibilities of electronic canal measurement.

HISTORY: Direct current measurement of electrical resistance between the mucous membrane and the periodontium was presented in 1962. This resistance is consistent in any portion of the periodontium regardless of age or tooth type. Alternating current devices were developed in 1969 (Endodontic Meter ®), but the large currents caused pain. High-frequency devices (Endocater®) reportedly have higher stability and make correct measurements in conductive fluids; the special coating prevents application in narrow canals, however. Changes in the impedance of the canal are measured by various methods, each developed to overcome the disadvantage of a high reading (obtaining a short working length) when the canal is filled with solutions. The Apit® method calculates the difference between two potentials of the root canal using current sources with two different frequencies. This device can be accurate in the presence of strong electrolytes, yet it must be calibrated in each canal. Also, it is unable to measure in dry canals. The "ratio method" has been commercialized as the Root ZX® (1991), which expresses the quotient of two impedances in terms of the electrode position within the canal. No calibration is required.

ADVANTAGES AND DISADVANTAGES OF ELECTRONIC CANAL MEASUREMENT:

| <i>Advantages</i> | <i>Disadvantages</i> |
|--|---|
| Only method that measures length to apical foramen, not to radiographic apex | Requires special device |
| Accurate | Accuracy influenced by electrical condition of canal |
| Easy and fast | Difficult in teeth with wide-open apex |
| Reduction of x-ray exposures | Inconsistent results in cases of vital pulps (except newly developed devices) |
| Artificial perforation can be recognized | |

HOW APEX LOCATORS SHOULD BE USED: At each electric contact point, a firm connection is required. Cervical leakage of current is the greatest cause of inaccurate measurements; leakage might be due to metal restorations, decay, and/or irrigants. Low readings (long working length) occur with very dry canals, and high readings have occurred in long-rooted teeth, when conventional devices were used. Large lateral canals can cause early indication of the apex. The electronic method is impossible for the wide-open case. Special instructions-with conventional devices, either electrolytes or desiccation cause false readings; with Apit®, dry canals cause difficulties; and with the Root ZX®, electrolytes in large apical canal portions give high readings.

Electronic canal length measurement continued

Electronic canal length measurement continued

FUTURE: Device improvements are being researched. The Root ZX® has been adapted for application with an ultrasonic unit, as the Solfy ZX®. Recently, application of the Root ZX® to an engine-driven, nickel titanium file system was developed. Each allows file tip monitoring during all instrumentation procedures.

July 1995

Christopher F. Bates

New philosophy for the treatment of avulsed teeth

Krasner P, Rankow HJ. New philosophy for the treatment of avulsed teeth. Oral Surg 1995;79:616-23.

PURPOSE: To review the research on avulsed teeth and recommend a treatment philosophy, based on the type of storage medium used, length of extraoral time, and stage of root development.

DISCUSSION: Low success rates of replanted avulsions (4-50%) have arisen largely because our dental profession has ignored unequivocal research conclusions. Tx has been nonspecific and unscientific. Each avulsed tooth arrives at the dental office with a specific set of conditions. Tx of these teeth should depend on specific clinical conditions, and should differ based on these factors. To provide the best chance for success after replantation, the root PDL cells should be as physiologically healthy as possible. This means maintaining or returning PDL cells to their original metabolic condition, thus providing cells that can later differentiate. Depleted metabolites must be replaced within 60-120 min of the exarticulation, or PDL cells undergo necrosis. Except for pH-balanced cell culture media, all are either damaging to PDL cells (water, saliva) or of limited benefit (milk, saline). Teeth that have been extraoral for 15 min or more should not be replanted immediately, but should be soaked in a cell-reconstituting media (CRM) for 30 min before replantation. Avulsed immature teeth should also be evaluated for potential to revascularize. Soaking these in doxycycline increases the rate of pulpal revascularization, since the dominant obstacle is contamination of infarcted tissues.

SPECIFIC TREATMENT RECOMMENDATIONS:

| <i>Category of avulsion</i> | <i>Recommended treatment</i> |
|--|---|
| Mature apex, < 15 min extraoral | Rinse with physiologic solution, gently replant |
| Mature apex, 15 min-24 h extraoral, with CRM | Replant immediately |
| Mature apex, 15-360 min extraoral, wet but non-CRM | Soak in CRM (Hank's) for 30 min, replant |
| Mature apex, < 120 min extraoral, dry storage | Soak in CRM (Hank's) for 30 min, replant |
| Mature apex, > 120 min extraoral, dry storage | Remove PDL, pulp. Soak in citric acid for 3 min, 1% SnF ₂ for 5 min, then 1 mg/20 ml doxycycline for 5 min. Replant. |
| Immature apex, < 15 min extraoral | Soak in doxycycline for 5 min, replant |
| Immature apex, 15 min-24 h extraoral, with CRM | Soak in doxycycline for 5 min, replant |
| Immature apex, 15-360 min extraoral, wet but non-CRM | Soak in CRM (Hank's) for 30 min, then doxycycline, replant |
| Immature apex, < 120 min extraoral, dry storage | Soak in CRM (Hank's) for 30 min, then doxycycline, replant |
| Immature apex, > 120 min extraoral, dry storage | Remove PDL, pulp. Soak in citric acid for 3 min, 1% SnF ₂ for 5 min, then 1 mg/20 ml doxycycline for 5 min. Replant. |

New philosophy for the treatment of avulsed teeth continued

New philosophy for the treatment of avulsed teeth continued

C&C: The authors stress that avulsed teeth could have far higher success if managed on the basis of the physiologic condition of the PDL cells, the status of root development, and the length of extraoral time. These guidelines are certainly more sophisticated than those provided by the AAE (1994), and appear well supported by the literature.

July 1995

Christopher F. Bates

Implications, prevention, and management of subcutaneous emphysema during endodontic treatment

Battrum DE, Gutmann JL. Implications, prevention, and management of subcutaneous emphysema during endodontic treatment. Endod Dent Traumatol 1995;11:109-14.

BACKGROUND: Subcutaneous emphysema (SCE) is the abnormal presence of air under pressure, along or between fascial planes. The most common dental etiology of SCE is use of the high-speed handpiece during restorative procedures or during surgical resection of impacted teeth. Cases pertaining to endodontic treatment have been documented; in many, the root canal had been irrigated with a syringe containing hydrogen peroxide. In all cases, the spread of tissue emphysema was rapid and extensive. SCE, in conjunction with endodontics, may last days to a few weeks; in most cases, antibiotics were prescribed and recovery was complete within 6 wk. Death occurred in one case, due to the use of compressed air in a mandibular anterior tooth. SCE may be classified as occurring either immediately or over periods of time. Often seen is localized swelling, discomfort, and crepitus, with soft tissue radiographs or CT scans showing tissue distention. Compressed air may spread along any of the potential fascial spaces. Although the temptation to use the air syringe in clearing the working site is great, this action could introduce high pressure air into the periradicular tissues, and perhaps along fascial planes. Introduced air can (1) remain until resorbed, leading to "ballooning" of tissues and crepitus along overlying involved tissues; (2) escape along the path of introduction, causing no damage; or (3) enter a blood vessel, and obstruct coronary or cerebral blood flow. Hydrogen peroxide has been implicated also in the etiology of SCE, since oxygen is liberated from H₂O₂ on contact with blood and tissue proteins. In most cases, binding of the irrigating needle occurred. No cases of SCE during surgical endodontic procedures have been reported; however, there are reports regarding SCE in which the high speed handpiece was used to section teeth prior to extraction.

CLINICAL GUIDELINES: **Prevention** - (1) Always use a rubber dam; (2) loosely place irrigation needles into the root canal; (3) deliver contents gently; (4) avoid H₂O₂ irrigation with open apices or highly hemorrhagic pulp canals; (5) use aspiration or paper points to dry canals; (6) avoid directing compressed air into the access opening; (7) use "vented" or motorized handpieces during surgical osseous entry and root-end resection; and (8) use ultrasonic devices for root-end preparations. **Identification** - The most prominent clinical feature of SCE is rapid swelling of the face and sometimes the neck. The affected area becomes puffy and crepitus is usually present. Pain is variable and of short duration. A differential diagnosis should include an allergic reaction, hematoma, and angioneurotic edema. **Management** - (1) Discontinue endodontic therapy; (2) reassure the patient; (3) ascertain the cause; (4) if solutions such as H₂O₂ are implicated, irrigate the portal of entry with water; (5) if painful, give local anesthetic; (6) if the swelling appears unrelated to SCE, consider allergy or angioneurotic edema; (7) consider antibiotics, since the introduced air may contain microorganisms; (8) consider analgesics due to anticipated distention; and (9) seek prompt medical attention should breathing difficulty occur.

Implications, prevention, and management of subcutaneous emphysema during endodontic treatment continued

Implications, prevention, and management of subcutaneous emphysema during endodontic treatment continued

C&C: Subcutaneous emphysema is a possible complication of both nonsurgical and surgical endodontic treatment. Prevention is the most effective treatment. Excellent review article.

August 1995

Christopher F. Bates

Maxillary permanent central incisor with abnormal crown size and dens invaginatus: case report

Duckmanton PM. Maxillary permanent central incisor with abnormal crown size and dens invaginatus: case report. Endod Dent Traumatol 1995;11:150-52.

PURPOSE: To describe a case of dens invaginatus (DI) in a twelve-year-old Australian boy.

CASE REPORT: The boy was referred to the dental hospital in Sydney in 1988 due to the unusual radiographic appearance of the max left central incisor. The tooth had an enlarged clinical crown with a cusp-like projection on the palatal surface. The tooth responded WNL to vitality testing, with no perio, palpation, or percussion symptoms. DI was visible radiographically. No treatment was indicated, and as of 5 years after 1st presentation, there had been no indication of pulp necrosis (though the xrays sure look suspicious).

DISCUSSION: DI has been reported to have an incidence between 0.25% and 10%, and around 42% occur in max lateral incisors. This case appears to be an Oehlers Type 2, with a group 3 crown form (talon cusp or lingual tubercle). Although no treatment was performed on this particular tooth, prophylactic restoration of the palatal tubercle may have been in order. The radiographs appear to show CAP and possibly internal resorption (could there be vital tissue in the dens with a necrotic main canal, thus giving positive vitality responses?).

August 1995

Michael Hall

Importance of anatomic variables in endodontic treatment outcomes: case report

Ida RD, Gutmann JL. Importance of anatomic variables in endodontic treatment outcomes: case report. Endod Dent Traumatol 1995;11:199-203.

PURPOSE: To present a case which exemplifies the anatomical limitations of nonsurgical root canal treatment, and demonstrates some of the varied healing results obtained from surgical root canal intervention.

CASE REPORT: A 42-yr-old man was referred with a chief complaint of a chronic draining sinus tract over the apex of tooth #10. Clinical and radiographic findings were consistent with pulpal necrosis and chronic suppurative periodontitis. The tooth was nonsurgically treated in two visits. At the 3-mo recall, the patient had remained symptomless and the sinus tract resolved. At 6 mo however, the periradicular lesion was expanding in size, and the sinus tract had reappeared. Subsequent surgical exposure of the alveolus revealed a soft tissue lesion 20 mm in diameter, which perforated both the buccal and lingual cortical plates. Surgical procedures included a 2-mm apical root resection, and root-end filling with Diaket. Histological examination revealed features consistent with a periradicular granuloma. Light and scanning electron microscopic examination of the root tip showed at least 5 accessory canals (one filled with gutta-percha, and another with sealer), and external resorption. Two years post-surgically, the patient was symptom-free, and a radiographic lamina dura circumscribed the entire root. A multilobular radiolucency persisted, near the center of the area previously occupied by the lesion.

DISCUSSION: This case illustrates the difficult task of complete cleaning and obturation of the canal space. The anatomic complexities of the radicular apex were indeed formidable, but are believed to be the norm, and not the exception. Use of an intracanal medicament, such as calcium hydroxide, may have helped debride and disinfect this canal system to the degree that surgical intervention would have been unnecessary. On the other hand, the use of calcium hydroxide may have been futile against resistant organisms, or those established outside the root canal. Apical scarring, as probably occurred in this case, is the non-pathologic formation of fibrotic tissue in areas of osseous healing. Perforation of the cortical plates and the size of the initial inflammatory lesion have been reported as etiologic factors in increasing the incidence of apical scar formation.

September, 1995

Christopher F. Bates

Cutting ability of an ultrasonic retrograde cavity preparation instrument

Waplington M, Lumley PJ, Walmsley AD, Blunt L. Cutting ability of an ultrasonic retrograde cavity preparation instrument. Endod Dent Traumatol 1995;11:177-80.

PURPOSE: To calibrate a commercially available ultrasonic retrograde cavity preparation instrument and to determine its effectiveness in cutting dentin.

M&M: The Neosonic by Amadent was used in this study, supplied with interchangeable SS tips designed for retrograde cavity preparations. Tips designated CT 1, CT 2, and CT 3 were used. The displacement amplitudes (DA) of the retrotips were measured under stereomicroscope using the technique previously described by Walmsley, et al., 1986. Nine single-rooted teeth were selected and mounted in autopolymerizing acrylic resin blocks. Activated ultrasonic tips were applied to the dentin for 1 m using a load of 20 g at 6 increasing power settings. The specimens were then fixed in a vice and minute vertical and horizontal displacements in grooves in the dentin surfaces produced by the retrotips were measured and analyzed through computer software applications.

RESULTS: The DA increased linearly with increasing power settings for all 3 retrotips, with the CT 2 showing the greatest displacement. The computer analysis of the dentin cuts showed that the depth of the cut increased linearly along with DA for all tips.

C&C: The CT 1 tip showed the lowest oscillation and cutting ability; it is designed for isthmus preparation between main canals, with the lower DA and cutting ability probable safety features. The CT 2 and 3 tips are main preparation tips, and showed greater DA and greater cutting ability. Which power setting to use during operation is unclear since dentin removal is possible across the full range of settings. The results of this study suggest that a medium to high power setting be used to reduce the time necessary to remove dentin and root filling material.

September 1995

Michael Hall

Ultrasonic preparation and obturation of root-end cavities

Sultan M, Pitt Ford TR. Ultrasonic preparation and obturation of root-end cavities. *Int Endo J* 1995;28:231-8.

PURPOSE: (1) To evaluate the effectiveness of a modified file in a piezo-electric handpiece for preparation of root-end cavities; (2) to compare this ultrasonic (US) file with hand filing in removing bacteria from the canal walls, and in the amount of smear layer created; and (3) to compare dye leakage along root-end fillings of amalgam or thermoplasticized gutta-percha (GP).

M&M: In the first part, 40 single-rooted teeth were endodontically prepared to size #40 using EDTA and 1% NaOCl as irrigants, apically resected, and then contaminated with *Enterococcus faecalis* for 10 d. In group 1, no further tx was done (controls); group 2 received only saline irrigation; group 3 teeth were hand instrumented (using saline irrigant) from the resected end to size #50; and in group 4, a modified K-flex file was used to US instrument the root-ends of the teeth (with saline irrigant), to size #50. This file had its shank reduced to fit within the holder of a Piezon Master US unit, and the final 6 mm was bent. All teeth were split, and scored for bacteria and smear using SEM, at 1, 3, and 5 mm from the resected end. In the second part of the study, 20 single-rooted teeth were endodontically prepared to size #25 using saline irrigant, obturated with GP/sealer, fitted and cemented with a post, apically resected, and US'ly prepared from the beveled end. Teeth in group 1 were filled with Tytin amalgam, and those in group 2 with Grossman's sealer and Obtura GP. The root-end-filled teeth were immersed in rhodamine B dye for 48 h, sectioned, and examined for leakage using both light and confocal microscopy.

RESULTS: Overall, US preparation produced significantly cleaner (lowest bacterial scores) canal walls at all levels, than did the hand instrument group. Hand instrumentation provided intermediate bacterial scores, whereas controls and saline irrigation samples were heavily contaminated, and similar. The smear layer scores for control and saline groups were similar (hardly any), and significantly lower than in either instrumentation group (which were similar). There were no statistical differences between the leakage of amalgam and GP root-end fillings, nor between the two methods of microscopy. The extent of leakage was such that each was considered successful.

C&C: The modified files were tested since they were less expensive than manufactured tips, and were compatible with the authors' available US units. They proved themselves able to function effectively when preparing the root-end, when considering the ability to remove bacteria. Further comparison with commercial devices would be nice, to determine if such "home-made" units can prepare isthmuses, resist file fractures, etc. The importance of adequate debridement during "reverse instrumentation", by whatever means, is much greater than trying to seal an incompletely cleaned canal. As the authors showed, amalgam and Obtura with sealer provide similar and adequate short-term sealing ability.